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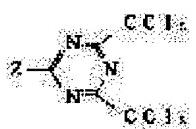
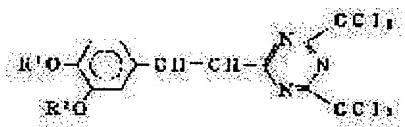
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(54) NEGATIVE TYPE RADIATION SENSITIVE RESIST COMPOSITION



(57)Abstract:

PURPOSE: To obtain a resist compsn. having high resolution and high sensitivity, capable of giving a resist pattern having a satisfactory profile shape and suitable for use in the production of a semiconductor device or in the working of a transparent electric conductive film for a liq. crystal display.

CONSTITUTION: A resin compsn. consisting of an alkali-soluble resin and alkoxyethylated amino resin is blended with a triazine compd. represented by formula I or a combination of the triazine compd. with a triazine compd. represented by formula II to obtain the objective radiation sensitive resist compsn. In

the formula I, each of R₁ and R₂ is 1-3C alkyl. In the formula II, Z is 4-alkoxy-phenyl, 4-alkoxynaphthyl, 2-(3,5-dialkoxyphenyl)ethenyl, 2-(2-furyl)- ethenyl, 2-(5-alkyl-2-furyl)ethenyl, 3,4-methylenedioxyphenyl or 2-(3,4-methylenedioxyphenyl) ethenyl.

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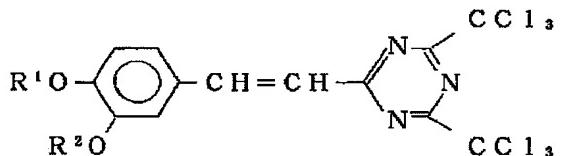
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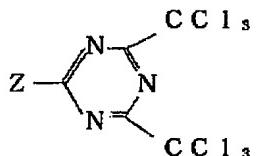
CLAIMS

[Claim(s)]

[Claim 1] (A) the resinous principle which consists of alkali fusibility resin and alkoxy methylation amino resin -- receiving -- (B) (b) general formula [** 1]



They are the triazine compound expressed with (R1 and R2 in a formula being the alkyl group of carbon numbers 1–3, respectively, and differing even if they are mutually the same) or the triazine compound of a ** (b) component, and a (b) general formula [** 2].



Z in [type 4-alkoxyphenyl radical, a 4-alkoxy naphthyl group, 2-(3, 5-dialkoxy phenyl) ethenyl radical, 2-(2-furil) ethenyl radical, 2-(5-alkyl-2-furil) ethenyl radical, The negative-mold radiation sensitivity resist constituent characterized by blending what combined the triazine compound expressed with] which is 3 and 4-methylenedioxophenyl radical or 2-(3, 4-methylenedioxophenyl) ethenyl radical.

[Claim 2] (A) The negative-mold radiation sensitivity resist constituent according to claim 1 which has the blending ratio of coal of the alkali fusibility resin in a component,

and alkoxy methylation amino resin in the range of 60:40 thru/or 99:1 by the weight ratio.

[Claim 3] (A) The negative-mold radiation sensitivity resist constituent according to claim 1 or 2 in the range whose loadings of the (B) component to a component are 0.5 – 15 % of the weight.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention has a new negative-mold radiation sensitivity resist constituent, the high definition which was suitable for micro processing in the electronic industry field, such as manufacture of a semiconductor device, and processing of the transparency electric conduction film for liquid crystal displays, when saying in more detail, and high sensibility, and relates to the negative-mold radiation sensitivity resist constituent which can moreover give the resist pattern of a good profile configuration.

[0002]

[Description of the Prior Art] In recent years, the advance of the densification in a semiconductor device and high integration is remarkable, and the definition in the ultra-fine processing technology is increasingly required to a submicron field. And Deep which is the ultraviolet rays of short wavelength in order to need micro processing 0.5 micrometers or less also about a lithography technique in use in the manufacture field of a semiconductor device and to respond to this The light source which emits light in single wavelength, such as UV, i line, and g line, and an excimer laser and KrF laser (wavelength of 248nm) are beginning to be used, and also development of the resist which induces an electron ray and X-rays is furthered.

[0003] About the negative-resist constituent which suits such a radiation, the various researches which used the trichloromethyl-ized triazine compound as a photopolymerization initiator or a photo-oxide generating agent are made positively in recent years. For example, a monomer with an ethylene nature partial saturation radical (JP,54-74887,A), The compound which has at least one ethylene nature partial saturation double bond and in which addition polymerization is possible (JP,54-151024,A), The resist constituent by combination with polymerization nature monomer components, such as a monomer (JP,60-105667,A) which carries out a

polymerization with a free radical or an acid, The resist constituent by combination with the resinous principle of cresol novolak resin, alkoxy methylation melamine resin (JP,2-146044,A), polyhydroxy styrene (JP,4-136858,A), etc. for which a bridge can be constructed is proposed.

[0004] However, it sets to these resist constituents. And the cross-section configuration of the resist pattern obtained lengthens SUSO, and a profile configuration tends to worsen. Upwards high definition is not acquired and it is Deep. UV, i line, g line, an excimer laser, There is a fault of not having practical sensibility to radiations, such as an electron ray and X-rays, and sublimate at the time of the postbake after a triazine compound with comparatively high sublimability developing negatives, and it adheres to a processing indoor wall in a crystallized state. When this fell on a processed substrate front face, it had become the cause of the abnormalities of lifting pattern formation in poor etching at the time of etching.

[0005] Thus, the actual condition is that the thing still practical about the negative-resist constituent containing the trichloromethyl-ized triazine compound as a sensitization agent used in the lithography technique using the various above mentioned radiations which can respond to especially micro processing 0.5 micrometers or less is not obtained.

[0006] For this reason, in the manufacture field of a semiconductor device or a liquid crystal display component, poor etching is not caused, it excels in definition and the profile configuration of a resist pattern, and development of the negative-mold radiation sensitivity resist constituent with high sensibility to various radiations is desired strongly.

[0007]

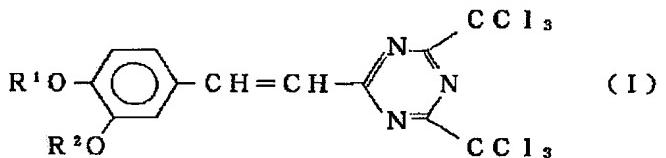
[Problem(s) to be Solved by the Invention] This invention is made for the purpose of offering a negative-mold radiation sensitivity resist constituent with the high sensibility which can realize good pattern formation, without causing poor etching, while responding to various radiations and excelling in the profile configuration of a resist pattern by high definition, in order to reply to such a request.

[0008]

[Means for Solving the Problem] this invention persons came to make this invention for the ability of that purpose to be attained based on a header and this knowledge by blending a specific triazine compound with the resinous principle which consists of alkali fusibility resin and alkoxy methylation amino resin, as a result of repeating research wholeheartedly that a negative-mold radiation sensitivity resist constituent suitable as an object for micro processing should be developed.

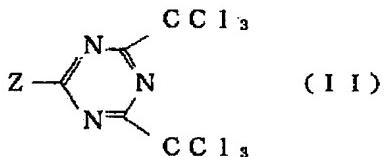
[0009] namely, the resinous principle to which this invention changes from (A) alkali fusibility resin and alkoxy methylation amino resin -- receiving -- (B) (**) -- a general formula (I)

[Formula 3]



the triazine compound expressed with (R1 and R2 in a formula being the alkyl group of carbon numbers 1–3, respectively, and differing even if they are mutually the same), or ** (**) -- the triazine compound of a component, and (**) -- a general formula (II)

[Formula 4]



Z in [type 4-alkoxyphenyl radical, a 4-alkoxy naphthyl group, 2-(3, 5-dialkoxy phenyl) ethenyl radical, 2-(2-furil) ethenyl radical, 2-(5-alkyl-2-furil) ethenyl radical, The negative-mold radiation sensitivity resist constituent characterized by blending what combined the triazine compound expressed with] which is 3 and 4-methylenedioxophenyl radical or 2-(3, 4-methylenedioxophenyl) ethenyl radical is offered.

[0010] As alkali fusibility resin used for this invention constituent, the copolymer of novolak resin, acrylic resin, styrene, and an acrylic acid, the polymer of hydroxystyrene and a copolymer, a Pori alpha-methylvinyl phenol, etc. are mentioned, for example, especially, polyhydroxy styrene and novolak resin are desirable and alkali fusibility novolak resin is still more desirable. About this alkali fusibility novolak resin, there is especially no limit and what carried out condensation of aromatic series hydroxy compounds, such as what is commonly used as matter for coat formation in the positive type photoresist constituent conventionally, for example, a phenol, cresol, and a xylanol, and the aldehydes, such as formaldehyde, to the bottom of existence of an acid catalyst is used. the weight average molecular weight which cut the low-molecular field as this alkali fusibility novolak resin -- 2000–20000 -- the thing of the range of 3000–15000 is preferably desirable.

[0011] The alkali fusibility novolak resin suitably used by this invention can be manufactured by carrying out the condensation reaction of the mixed phenolic compound and formalin which contain at least one sort at a predetermined rate chosen from phenol, m-cresol and p-cresol, 2, and 5-xylenol and 3,5-xylenol, respectively under existence of an acid catalyst. When taking amelioration of the profile of a resist pattern into consideration in this invention, what used 30 % of the weight or more of m-cresol is suitable.

[0012] although there is especially no limit and a well-known thing can be used about polyhydroxy styrene on the other hand -- weight average molecular weight 3000-50000 -- the thing of the range of 5000-30000 is preferably suitable.

[0013] In this invention constituent, especially as alkoxy methylation amino resin which is another resinous principle of the (A) component, methoxymethyl-ized melamine resin, ethoxymethyl-ized melamine resin, propoxy methylation melamine resin, butoxy methylation melamine resin, a methoxymethyl-ized urea-resin, an ethoxymethyl-ized urea-resin, a propoxy methylation urea-resin, a butoxy methylation urea-resin, etc. are mentioned to alkoxy methylation melamine resin, an alkoxy methylation urea-resin, and a concrete target, and these may be used independently and may be used combining two or more sorts. These alkoxy methylation amino resin can be manufactured by making this etherify with lower alcohol, such as methyl alcohol, ethyl alcohol, propyl alcohol, and butyl alcohol, and taking out the resin which subsequently cools reaction mixture and deposits, after making a melamine or a urea, and formalin react to the bottom of an acid catalyst for example, in an ebullition water solution and obtaining a condensate.

[0014] Especially in said alkoxy methylation amino resin, alkoxy methylation melamine resin is desirable and, as for this alkoxy methylation melamine resin, what is obtained by etherifying the methylol radical of the methylol-ized melamine obtained by the conventional method, and etherified the methylol radical 3.5 or more preferably an average of 2.5 or more is desirable. NIKARAKKU Mx-750 marketed practically, NIKARAKKU Mx-706, NIKARAKKU Mx-101, NIKARAKKU Mx-032, NIKARAKKU Mx-708, NIKARAKKU Mx-40, NIKARAKKU Mx-31, NIKARAKKU Ms-11, NIKARAKKU Mw-22, NIKARAKKU Mw-30 (above, made in Sanwa Chemical), etc. can be used preferably. These may be independent or may be used combining two or more sorts.

[0015] next, this invention constituent -- setting -- as the (B) component -- (**) -- the triazine compound expressed with a general formula (I), or ** (**) -- the triazine compound of a component, and (**) -- what combined the triazine compound expressed with a general formula (II) is used.

[0016] said (**) -- as a triazine compound expressed with the general formula (I) of a component For example, 2-[2-(3, 4-dimethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-methoxy-4-ethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-methoxy-4-propoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-ethoxy-4-methoxypheny) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3, 4-diethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-ethoxy-4-propoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-propoxy-4-methoxypheny) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-propoxy-4-ethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3, 4-dipropoxy phenyl) ethenyl]-4 and 6-bis(trichloromethyl)-1,3,5-triazine etc. can be mentioned. These triazine compounds may be used independently and may be used combining two or more sorts.

[0017] on the other hand -- said (**) -- (**) which combines with the triazine compound of a component according to a request, and is used -- as a triazine compound expressed with said general formula (II) of a component For example, 2-(4-methoxypheny)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-ethoxy phenyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-propoxy phenyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-butoxy phenyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-methoxy naphthyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-ethoxy naphthyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-propoxy naphthyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-butoxy naphthyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-methoxy-6-carboxy naphthyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(4-methoxy-6-hydroxy naphthyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(2-furil) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(5-methyl-2-furil) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(5-ethyl-2-furil) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(5-propyl-2-furil) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3, 5-dimethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-methoxy-5-ethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-methoxy-5-propoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-ethoxy-5-methoxypheny) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3, 5-diethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-ethoxy-5-propoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-propoxy-5-methoxypheny) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3-propoxy-5-ethoxy phenyl) ethenyl]-4,

6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3, 5-dipropoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-(3, 4-methylenedioxyphenyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(3, 4-methylenedioxyphenyl) ethenyl]-4, and 6-bis(trichloromethyl)-1,3,5-triazine etc. is mentioned. One sort of these triazine compounds may be used and they may be used combining two or more sorts.

[0018] Especially a desirable thing in the trichloromethyl-ized triazine compound of said (b) component 2-(4-methoxyphenyl)-4, 6-bis(trichloromethyl)-1,3,5-triazine, 2-[2-(5-methyl-2-furil) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine, It is 2-(3, 4-methylenedioxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine, and these are together put at the triazine compound of a (b) component, and a rate of arbitration, and are used.

[0019] As advantageous combination of a ** (b) component and a (b) component (1) -- (**) -- what combined 2-(4-alkoxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine to the component -- (2) -- (**) -- what combined 2-(3, 4-methylenedioxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine to the component -- (3) -- (**) -- what combined 2-[2-(5-alkyl-2-furil) ethenyl]-4 and 6-bis(trichloromethyl)-1,3,5-triazine to the component -- (4) As opposed to a (b) component What consists of three components which combined 2-[2-(5-alkyl-2-furil) ethenyl]-4 and 6-bis(trichloromethyl)-1,3,5-triazine and 2-(3, 4-methylenedioxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine, And (5) (b) components are received. What consists of three components which combined 2-(3, 4-methylenedioxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine and 2-(4-alkoxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine Although it can mention, what consists of three components of (4) and (5) in these combination, and the thing which consists of three components of (4) especially are suitable. moreover, (**) -- although it is desirable to be contained 50% or more on weight criteria to the amount of the whole triazine compound as for the blending ratio of coal of a component --- (**) --- when 2-(3, 4-methylenedioxyphenyl)-4 and 6-bis(trichloromethyl)-1,3,5-triazine is used for a component, a (b) component and the total quantity of this should just be 50% or more to triazine compound all weight.

[0020] As for the alkali fusibility resin and alkoxy methylation amino resin of the (A) component, about the blending ratio of coal of each of said component in this invention constituent, it is desirable for a weight ratio to use at 60:40 thru/or 99:1, and a rate that is preferably set to 75:25 thru/or 98:2. If the rate of these resinous principles deviates from said range, even if it blends the (B) component, the resist constituent of high performance will not be obtained.

[0021] moreover, the (B) component, i.e., (**), -- the triazine compound independence of a component, or (**) -- a component and (**) -- the triazine compound which consists of combination with a component is preferably blended in 1 – 10% of the weight of the range 0.5 to 15% of the weight to the aforementioned (A) component. Since the solubility over the alkali water solution of a resist will worsen and development nature will fall if the purpose of this invention is not fully attained at less than 0.5 % of the weight and these loadings exceed 15 % of the weight, it is not desirable.

[0022] this invention constituent can be made to contain additives of common use, such as a coloring agent for making the additional resin for improving the engine performance of the additive which is compatible in the range which does not spoil the purpose of this invention if needed, for example, the resist film, etc., a plasticizer, a stabilizer, a surfactant, and the developed image much more in visible, and a sensitizer for raising the sensitization effectiveness more, a color for antihalation.

[0023] As for this invention constituent, it is advantageous to dissolve in an organic solvent and to use said each component in the form of a solution. As such an organic solvent, for example An acetone, a methyl ethyl ketone, A cyclohexanone, isobutyl methyl ketone, isoamyl methyl ketone, Ketones, such as a 1, 1, and 1-trimethyl acetone; Ethylene glycol, The monomethyl ether of propylene glycol, diethylene-glycol, and ethylene glycol mono-acetate or diethylene-glycol mono-acetate, The monoethyl ether, the monopropyl ether, mono-isopropyl ether, Polyhydric alcohol and the derivatives of those, such as the monobutyl ether or the monophenyl ether; Ring type ether; and methyl acetate like dioxane, Ester, such as ethyl acetate, butyl acetate, methyl lactate, ethyl lactate, methyl pyruvate, pyruvic-acid ethyl, and 3-ethoxy ethyl propionate, can be mentioned. These may be independent, or may mix and use two or more sorts.

[0024] Next, if how to form a detailed pattern is explained using the solution of the negative-mold radiation sensitivity resist constituent prepared by doing in this way On a substrate like a silicon wafer, the solution of this resist constituent is first applied with a spinner etc. g line, i line, Deep after drying and preparing a radiation induction layer Heat-treatment is performed, after irradiating UV, an excimer laser, and X-rays alternatively through a mask, or scanning an electron ray and irradiating it.

Subsequently For example, by developing negatives using organic alkali water solutions, such as 2 – 10% of the weight of tetramethylammonium hydroxide, and a choline, dissolution removal is carried out alternatively and a non-irradiating part can form the resist pattern excellent in the profile configuration.

[0025]

[Effect of the Invention] since an improvement of prevention of contamination of a processing indoor wall with the triazine compound sublimated at the time of postbake, and poor etching accord to fall of a up to [the processed substrate front face of this affix] further and a poor pattern be realize and it have high sensibility to various radiations, the negative mold radiation sensitivity resist constituent of this invention be use suitable for manufacture of the device of the semi-conductor with which especially micro processing-ization progress, while being able to form the resist pattern excellent in definition and a profile configuration.

[0026]

[Example] Next, although an example explains this invention to a detail further, this invention is not limited at all by these examples. In addition, whenever [in each example / sublimability] is evaluated as follows.

[0027] Whenever [sublimability]; the obtained wafer, and it observed whether the crystal of a triazine compound would be accepted in a processing indoor wall, and the following criteria showed it. [160 degrees C] [for 90 seconds]

O : As for a crystal, after 300-sheet BEKU is not accepted.

O : A crystal is accepted after 200-299-sheet BEKU.

**: A crystal is accepted after 100-199-sheet BEKU.

x: A crystal is accepted after 50-99-sheet BEKU.

[0028] 1m-cresol of examples and p-cresol are mixed at a rate of 70:30 by the weight ratio. Formalin is added to this. A resinous principle is received in NIKARAKKU Mw-30 (made in Sanwa Chemical) which is 25g (weight average molecular weight 6000) of cresol novolak resin and alkoxy methylation melamine resin which condensed with the conventional method and were obtained using the oxalic acid catalyst. After dissolving 3 % of the weight (0.75g) in 100g of ethyl lactates, this solution is received at the total quantity of cresol novolak resin and alkoxy methylation melamine resin. The resist solution was obtained by carrying out pressure filtration of what added 2-[2-(3, 4-dimethoxy phenyl) ethenyl]-4 and 6-bis(trichloromethyl)-1,3,5-triazine at 3% of the weight of a rate, and was dissolved using the membrane filter of 0.2 micrometers of apertures.

[0029] Next, 1.0-micrometer thickness resist layer was formed by carrying out a spin coat for 20 seconds by 4000rpm, and drying for 90 seconds at 90 degrees C on a hot plate on the 5 inch silicon wafer which carried out surface preparation of the obtained resist solution by leaving it for 7 minutes in a hexamethyldisilazane ambient atmosphere. By contraction projection aligner 1505G7E for g lines (NIKON CORP.

make), after exposing g line alternatively, heat-treatment is performed in the formed resist layer for 90 seconds at 110 degrees C. Subsequently, subsequently After carrying out dissolution removal of the non-irradiating part of g line by carrying out a dipping to a tetramethylammonium hydroxide water solution for about 1 minute at 23 degrees C 2.38% of the weight, this wafer, and the resist pattern was obtained. [on the hot plate] [160 degrees C] [for 90 seconds] This resist pattern was a 0.50-micrometer resist pattern which has the good profile configuration which rose steeply perpendicularly from the silicon wafer side. Moreover, although 300 wafers were processed by same actuation, the deposit of the crystal of a triazine compound was not found by the processing indoor wall.

[0030] the mixed rate of an example 2 – 9 alkoxy methylation amino resin -- 5 % of the weight (1.25g) -- moreover, except having changed the class and loadings of a triazine compound, as shown in Table 1, the same actuation as an example 1 was performed, and it asked for whenever [sublimability / at the time of the postbake of each resist], and, sensibility. The result is shown in Table 1.

[0031]

[Table 1]

実施例	トリアジン化合物		昇華性度	感度 (m s)
	種類	配合量(重量%)		
2	T ₄	5	◎	120
3	T ₄ : T ₂	5 : 5	◎	80
4	T ₄ : T ₁	5 : 5	◎	110
5	T ₄ : T ₃	5 : 5	◎	110
6	T ₄ : T ₃ : T ₂	3 : 3 : 4	◎	100
7	T ₄ : T ₃ : T ₁	3 : 3 : 4	◎	150
8	T ₄ : T ₂ : T ₁	5 : 3 : 2	◎	100
9	T ₄ : T ₃ : T ₂	5 : 5 : 5	◎	70

[0032] the mixed rate of the example 1 of a comparison – 5 alkoxy methylation amino resin -- 5 % of the weight (1.25g) -- moreover, except having changed the class and loadings of a triazine compound, as shown in Table 2, the same actuation as an example 1 was performed, and it asked for whenever [sublimability / at the time of the postbake of each resist]. The result is shown in Table 2.

[0033]

[Table 2]

比較例	トリアジン化合物		昇華性度
	種類	配合量(重量%)	
1	T ₂	1.5	×
2	T ₁	1.5	×
3	T ₂ : T ₁	5 : 5	×
4	T ₃ : T ₂	5 : 5	△
5	T ₃ : T ₁	5 : 5	△

[0034] In Table 1 and 2, T1, T2, T3, and T four show the semantics as follows, respectively.

T1:2-4, 6-screw (4-methoxyphenyl) - 1,3,5-triazine T2:2-[2-(5-methyl-2-furil) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine T3:2-(3, 4-methylenedioxyphenyl)-4, 6-screw (Trichloromethyl) (Trichloromethyl) - 1,3,5-triazine T4:2-[2-(3, 4-dimethoxy phenyl) ethenyl]-4, 6-bis(trichloromethyl)-1,3,5-triazine

[Translation done.]